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A LABORATORY AUDIT OF THYROID HORMONE REQUEST PATTERN IN A RURAL TERTIARY HEALTH INSTITUTION IN NIGERIA

Pathology

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ABSTRACT

INTRODUCTION: Thyroid disorders are conditions associated with many vague clinical symptoms. Request for thyroid assessment may depend on the presence of symptoms and signs suggestive of thyroid disorders. For a reliable interpretation of laboratory result; certain information are requested about the management of the patient in the laboratory request form. This retrospective study looks at the pattern of request and relevant information made available for appropriate test interpretation for thyroid hormone.

MATERIALS AND METHOD: A five years retrospective study of the Thyroid hormone request pattern was done. 296 requests for thyroid hormones were extracted from the register. All the entries had the gender included; with 89.5% females and 10.5% males. 11.5% did not contain the clinical diagnosis of the patient. 5.7% did not indicate the age. TSH was analysed in 288 requests, fT4 in 277 and fT3 in 275. Goitre was the most common clinical diagnosis, 32.3%; hyperthyroidism and thyrotoxicosis 13.1%; while hypothyroidism 2.7%. Non-specific symptoms of thyroid diseases were 13.1%. Gynaecological cases were 18.5%.

CONCLUSION: Information in laboratory request form provides guidelines for Pathologist to give reliable interpretation on subsequent mode of management of patient. Interpretative comments reduced the time taken and the number of tests required to reach a diagnosis and had an impact on the differential diagnosis.

KEYWORDS

Thyroid disorders, Laboratory Audit, Interpretation

INTRODUCTION

Thyroid disorder is one of the common endocrine disorders second to DM in prevalence globally. It is condition associated with many vague clinical symptoms. Anterior neck swelling may be a presenting feature of the disorder, clinical signs of functionality of the gland either excessively or inadequate may also be a presenting feature by the patient. Thyroid disorders may present with cardiovascular complications and other co-morbidities, which increase morbidity and mortality in affected patients[1, 2]. Reports have shown that thyroid dysfunction may present primarily as a gynaecological disorder[3, 4] or even during pregnancy [5].

It is a disorder with clinical and biochemical implications, that are encountered in clinical practice often mislabelled as psychosomatic disorders[6]. Thyroid dysfunction may also be as result of other non-thyroid illnesses manifesting with clinical or biochemical features suggestive of dysfunction of the thyroid. Request for thyroid assessment by clinicians may depend on the presence of symptoms and signs suggestive of thyroid disorders.

Laboratory audit evaluate the component of laboratory services; providing feedback to staff and users about laboratory functions. The pre-analytical phase, analytical phase and post-analytical phase are the three component of laboratory auditing[7]. For adequate interpretation of laboratory result; an important aspect of post-analytical phase, certain information are usually requested from the clinician about the management of the patient. A reliable laboratory result should be well interpreted by the pathologist, inclusive of the appropriate advise on the next line of investigations which can only be given if adequate information are made available in the requisition forms; an important aspect of pre-analytical phase. These processes constitute a significant aspect of Laboratory quality management.

Federal Teaching Hospital is tertiary health institution established by the government of Nigeria to the rural community of Ekiti state. It was affiliated to Afe Babalola University, Ado-Ekiti, (ABUAD), to serve as the teaching hospital for the training of its medical and allied health professional students in 2014. The institution is located in Ido/Osi local government of Ekiti State is manned by specialists in various fields of medicine to provide tertiary specialist services. This retrospective study looks at the pattern of request and relevant information made available for appropriate test interpretation for thyroid hormone test in rural tertiary institution from June 2013 to September 2018.

MATERIALS AND METHODS

This is a retrospective review of laboratory request for thyroid hormone analysis from June 2013 to September 2018 at the department of Chemical Pathology, Federal Teaching Hospital, Ido-Ekiti. The Federal Teaching Hospital is one of the two tertiary health facilities in Ekiti State with a bed space of about 350. The hospital is located in Ido-Ekiti, a rural town in the Ido/Osi local government area of the state. Request for thyroid hormone test are usually submitted at the reception of Chemical Pathology Laboratory of the hospital. Detail information requested for in the laboratory form includes name of patient, gender, address of patient, age, name of requesting physician, clinical details and diagnosis, and parameters to be assayed. The following information are usually extracted from the requisition form and included in the laboratory register for thyroid hormone assay; name of patient, hospitals number, age, sex, request clinic or wards and clinical diagnosis and thyroid hormone requested for by the physician. For this review; the age, gender, clinical diagnosis and type of thyroid hormone request were extracted from the laboratory register.

RESULTS

A total of 296 requests for thyroid hormone were entered between 2013 and 2018. Table 1 shows the biostatistics of the information made available in the requisition form as extracted into the laboratory register. The result showed that 34(11.5%) entries did not contain the clinical diagnosis of the patient. All the entries had the gender of the patient included; there were 265 (89.5%) females and 31(10.5%) males; giving a female to male ratio of 8.5:1. Also 17(5.7%) of the entries did not indicate the age of the patient. TSH was analysed for 288 samples, fT4 was analysed for 277 while fT3 was analysed for 275 samples.

TABLE 1: BIOSTATISTICS OF INFORMATION MADE AVAILABLE ON THYROID HORMONES REQUEST FORM

VARIABLE	NUMBER	PERCENTAGE
CLINICAL DIAGNOSIS INDICATED	262	88.5
NOT INDICATED	34	11.5
TEST REQUEST		
TSH		
INDICATED	288	97.3
NOT INDICATED	8	2.7
FT4		
INDICATED	277	93.6
NOT INDICATED	19	6.4
FT3		
INDICATED	275	92.9
NOT INDICATED	21	7.1
SEX DISTRIBUTION		
FEMALE	265	89.5
MALE	31	10.5
INDICATION OF AGE		
INDICATED	279	94.3
NOT INDICATED	17	5.7

In Table 2, details of the clinical diagnoses are shown. Goitre was the most common clinical diagnosis requested for among thyroid disorders with 96 (32.3%) cases. Patients with clear cut diagnosis of hyperthyroidism and thyrotoxicosis constitute 39 (13.1%) cases; while hypothyroidism was 8 (2.7%) cases. There were 19 (6.4%) cases of patients with non-specific symptoms of thyroid diseases. Gynaecological cases constitute 55 (18.5%) with infertility being 37 (12.5%) cases. Only 15 (5.05%) cases were for routine clinical examination. Other clinical diagnoses that were not directly related to thyroid disorder constitute only 6 (2%) cases.

TABLE 2: CLINICAL DIAGNOSIS OF REQUEST FOR THYROID HORMONES

CLINICAL DIAGNOSIS		FREQUENCY	
GOITRE		96	(32.32%)
	SIMPLE GOITRE	82	(27.6%)
	MULTINODULAR GOITRE	4	(1.35%)
	TOXIC GOITRE	10	(3.37%)
THYROID DISORDERS		47	(15.8%)
	THYROTOXICOSIS	19	(6.4%)
	THYROID EYE DISEASE	3	(1.01%)
	HYPERTHYROIDISM	17	(5.72%)
	HYPOTHYROIDISM	8	(2.69%)
NON SPECIFIC THYROID DISEASE SYMPTOMS		19	(6.4%)
	ANXIETY DISORDERS	2	(0.67%)
	ARRHTHYMIAS	2	(0.67%)
	HEAT INTOLERANCE	1	(0.34%)
	DEPRESSION	2	(0.67%)
	EXCESSING SWEATING	2	(0.67%)
	WEIGHT GAIN	1	(0.34%)
	TACHYCARDIA	2	(0.67%)
	PALPITATION AND TREMOR	7	(2.36%)
CARDIOVASCULAR DISEASES		19	(6.4%)
	HYPERTENSION	14	(4.71%)
	HEART FAILURE	3	(1.01%)
	STROKE	2	(0.67%)
GYNAECOLOGICAL CASES		55	(18.5%)
	PRIMARY INFERTILITY	14	(4.71%)
	SECONDARY INFERTILITY	23	(7.74%)
	AMENORRHEA	3	(1.01%)
	UTERINE BLEEDING	9	(3.03%)
	PCOS	1	(0.34%)
	HYPERPROLACTINEMIA	4	(1.35%)
	SEVERE PREECLAMPSIA	1	(0.34%)
ROUTINE MEDICAL EXAMINATION		15	(5.05%)
POST THYROIDECTOMY		6	(2.02%)
NO CLINICAL DIAGNOSIS		34	(11.4%)
OTHERS		6	(2.03%)
	ARTHRITIS	1	(0.34%)
	BONE PAINS	1	(0.34%)
	DIABETES MELLITUS	2	(0.67%)
	INSOMNIA	1	(0.34%)
	LOW GRADE FEVER	1	(0.34%)
TOTAL		297	(100%)

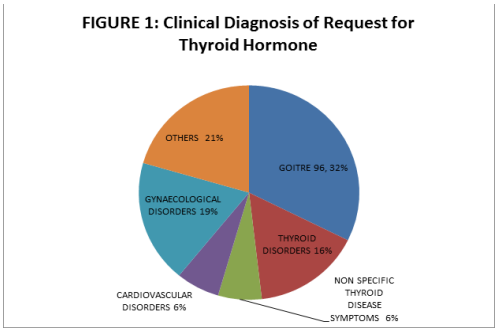

Figure 1 shows the pie chart distribution of the clinical diagnosis for the 296 cases seen over the stated period.

DISCUSSION

Laboratory investigations have always play an important role in the management of diseases. Detail information about the patient and disease condition has much impact on appropriate interpretation of such investigation. As an important aspect of post analytical quality assurance; result interpretation contributes significantly to the outcome of patient management. The laboratory result must be interpreted on the background of a reference interval, intra-individual biological variation, influence of analytical errors as well as diagnostic sensitivity and specificity. Appropriate filling of the requesting forms for laboratory investigation containing details about the patient, history of the disease; medications etc will also go a long way to achieve this positive goal. Such information may guide the clinician on the next step to take either to do further investigation or to change the line of management or sustain the present line of management. Summarily, blood tests can be used for screening, risk assessment, disease diagnosis or prognosis, and treatment initiation or monitoring.

Thyroid disease is a common hormonal disorder second to DM in prevalence globally. With availability of diagnostic tool appropriate line of management can be instituted. Clinical details/diagnosis/ history/ impression will enable a laboratory physician to appropriately interpret the thyroid hormone profile test. In this study more than 89.5% of the requesting physician did give information on the diagnosis or history of the patient. A higher percentage of 96.3% was found by Mshelia et al in study in Maiduguri[8]. In review of Laboratory Request form filling in Ile-Ife, Adegoke et al found that 92.2% of the forms contained the clinical diagnosis[9]. In Tanzania, an audit of clinical laboratory practice in haematology by Makubi et al found that 37.9% of the laboratory request form for haematology test has the diagnosis indicated in the form[10], a similar study in Northwest Nigeria shows that 99.8% and 80.9% in department of haematology and Blood Transfusion Services respectively had clinical diagnosis indicated in their forms[11]. The laboratory physician interpretation of the thyroid hormone result may differ from what the requesting physician has in mind; as is seen in the interpretation of perfusion images for coronary artery disease which was said to differ between the nuclear physician who carried out the imaging procedure and the clinician requesting for the test[12]. The clinician must use the laboratory result in the right context; but it is also of utmost importance that the laboratory physician understands what is behind the test for appropriate interpretation. In survey in South Africa; 42% of doctors surveyed despite being confidence of their pretest diagnosis "would still think of what else could it be" thus requesting for laboratory investigation. 78% of doctors from same survey find interpretive comments by the laboratory been very useful[13]. In a study assessing the impact of narrative interpretations for complex laboratory tests, it was found out that the comments reduced the time taken and the number of tests required to reach a diagnosis and had an impact on the differential diagnosis. The study also found out that most respondents felt that the interpretive comments helped prevent a misdiagnosis[14]. In our review, 5.7% of the request form did not indicate the age of the patient. Mshelia in Maiduguri found that 19% of the request form did not indicate age of the patient[8]. The age of a patient is very vital in the interpretation of any laboratory result, particularly in thyroid hormone. In a study in Ile-Ife, Adegoke[9] found only 86.4% indicated the date of birth of patients on the laboratory requisition form. It has been recommended that age-

related reference value should be use in the interpretation of thyroid hormones. Age-related thyroid dysfunction is also common. Normal aging is accompanied by a slight decrease in pituitary TSH release but especially by decreased peripheral degradation of T4, which results in a gradual age-dependent decline in serum triiodothyronine (T3) concentrations without changes in T4 levels[15]. Non documentation of age can also pose a challenge for research and epidemiological studies. In this review, more than 97% of request for thyroid hormone assessment requested TSH, fT3 and fT4. Considering the cost and the location of our hospital in poor resources country; this may not be cost effective. With only 48% of the patients under review having clear diagnosis of thyroid dysfunction (Goitre and Thyroid Disorder), TSH alone should have been requested to confirm or rule out thyroid dysfunction. Many guidelines for the detection of thyroid disease recommend a first-line TSH-only strategy[16,17]. TSH should be the first test to be done in any patient with suspected thyroid dysfunction. Small changes in thyroid function cause significant increase in TSH secretion. TSH may be elevated even in subtle thyroid dysfunction. In many situations, a normal TSH level can be sufficient indication to halt further testing of thyroid function. To assess the severity of hyperthyroxinemia, fT4 may be done in a patient with hyperthyroidism because it is mostly elevated in such patient. In a patient with hyperthyroidism on treatment, the TSH levels may be suppressed for a long period of time and is not a good indicator of thyroid function. fT4 may also assist in the diagnosis of subclinical hyperthyroidism, even when such patient are clinically euthyroid. Serum fT4 is useful if secondary hypothyroidism is suspected where TSH may be within normal range even though serum T4 is below normal. fT3 is not advisable in routine clinical practice, because of its short half life and near normal levels maintained by several homeostatic mechanisms, the level is usually normal. fT3 should be measured in a patient with suppressed TSH and normal fT4 but who shows clinical features of hyperthyroidism. This is to rule out T3 toxicosis, which is seen in 5% of patients with Graves disease[18].

Thyroid function test is not only requested in patients with thyroid-related disorders but also in other disorders with or without evidence of thyroid hormone involvement such as infertility and related disorders[19,20,21,22], diabetes mellitus[23], and cardiac disease[24]. Other clinical conditions or symptoms and signs that necessitate laboratory investigation of thyroid hormone in this study include gynaecological diseases with infertility constituting 12.5%; cardiovascular diseases constituting 6.4%; post thyroidectomy was 2.0% and routine medical examination was 5.05% of all cases. Serum TSH as an initial assessment for the presence of hyperthyroid or hypothyroid would have been more cost effective.

CONCLUSION:

Adequate information in a laboratory request form goes along way in providing important information for the Pathologist to give reliable interpretation to the requesting physician on subsequent mode of management of such patient. Considering the fact that majority of the users of our facilities resides in this poor resources community appropriate test ordering for the confirmation of the presence of thyroid dysfunction would have been more cost effective. It can be concluded that this audit of request pattern of thyroid hormone has shown the importance of proper filling of laboratory request form for thyroid hormone profile and the need to consider cost when making such request in our environment.

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